Lab Code: 200167-0

FCC PART 90

TEST AND MEASUREMENT REPORT

For

Cellphone-Mate Inc.

43116 Christy Street
Fremont, CA 94538, USA

FCC ID: RSNCM800-IDEN
Model:CM800-iDEN

Report Type:	**Product Type:**
Original Report	Cellular Repeater

Test Engineer:	Victor Zhang
Report Number:	R0811263-90
Report Date:	2008-12-08
Reviewed By:	Boni Baniqued Sr. RF Test Engineer
Prepared By: **(66)**	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Ave Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R0811263-90	Original Report	2008-12-08

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The Cellphone-Mate, Inc. product, CM800-iDEN FCC ID: RSNCM800-IDEN or the "EUT" as referred to in this report, is a CM800-iDEN 800 MHz Repeater with N female type connectors.

Operation Description:

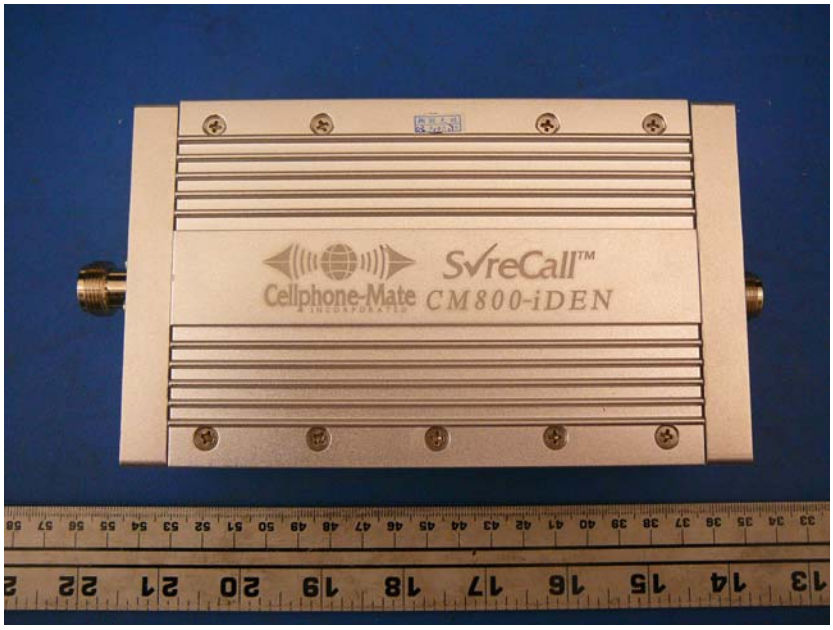
- Operating Frequency: *Downlink: 851-866 MHz*
  Uplink: 806-821 MHz
- Emission Designator: GXW
- Modulation: iDEN (16-QAM)
- Power Source: 110V/60 Hz AC Power Adapter

1.2 Mechanical Description

The EUT Approximate measurement is: 170mm (L) x 98 mm (W) x 55 mm (H). It is of metallic construction.

** The test data gathered are from typical production sample, serial number: CM081015-04004, provided by the manufacturer.*

1.3 EUT Photo



Please see additional photos in Exhibit C

1.4 Objective

This type approval report is prepared on behalf of Cellphone-Mate Inc. in accordance with Part 2 Subpart J, and Part 90 Subpart I, of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation, frequency stability, band edge, and conducted and radiated margin.

1.5 Related Submittal(s)/Grant(s)

No Related Submittals

1.6 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 90 Subpart I

Applicable Standards: TIA EIA 98-C, TIA/EIA603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values ranging from +2.0 dB for Conducted Emissions tests and +4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

1.8 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

2.2 EUT Exercise Software

N/A. Signal was sent through EUT using a signal generator; device was set to normal operating mode.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Oriental Hero ELE. FTY.	AC/DC Switch Adapter	OH-1048A0904000U-U	-

2.5 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
-	-	-	-

2.6 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	< 3m	Signal Generator	Input/ EUT
RF cable	< 3m	Output/ EUT	Spectrum analyzer

3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§ 2.1046 § 90.205	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	N/A
§ 2.1049 § 90.209	Occupied Bandwidth and Emission Mask	Compliant
§ 2.1051 § 90.210 § 90.669	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1053 § 90.210	Field Strength of Spurious Radiation	Compliant
§ 2.1055 § 90.213	Frequency Stability	N/A
§2.1091	RF Exposure (MPE)	Compliant

4 §2.1046 and §90.205 – RF OUTPUT POWER

4.1 Applicable Standard

According to FCC §2.1046 and §90.205,
(i) 806-824 MHz/851-869 MHz and 896-901 MHz/935-940 MHz. Power and height limitations are specified in Sec. 90.635. And according to FCC §90.635, the power level is limited to 500 Watt.

4.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the signal generator and the spectrum analyzer through sufficient attenuation.

4.3 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	101.7kPa

** The testing was performed by Victor Zhang on 2008-11-26.*

4.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	ESG Vector Signal Generator	E4438C	WBC88282L	2008-01-22
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

4.5 Summary of Test Results

Mode		Channel	Frequency (MHz)	Output Power (dBm)	Output Power (Watt)	Limit (Watt)
iDEN	Uplink	Low	806	26.08	0.4055	500
		Middle	813.5	26.58	0.4550	500
		High	821	26.22	0.4188	500
	Downlink	Low	851	25.19	0.3304	500
		Middle	858.5	27.2	0.5248	500
		High	866	26.62	0.4592	500

5 §2.1047 - MODULATION CHARACTERISTIC

5.1 Applicable Standard

According to FCC § 2.1047(d) and part 24E, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

5.2 Test Result

N/A

6 §2.1049 and §2.209 – OCCUPIED BANDWIDTH

6.1 Applicable Standard

Requirements: CFR 47, Section 2.1049.

6.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

According to the FCC 2-11-04/EAB/RF, Input and output signals were compared to verify that there was no any degradation to the signal due to amplification and conversion from the repeater using an RBW of 300 Hz or 1% of the emission bandwidth. Then the 26 dB & 99% bandwidth was recorded.

6.3 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	101.7kPa

** The testing was performed by Victor Zhang on 2008-11-26.*

6.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	ESG Vector Signal Generator	E4438C	WBC88282L	2008-01-22
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

***Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

6.5 Summary of Test Results

Mode		Channel	Frequency (MHz)	26dB Bandwidth (kHz)	99% Bandwidth (kHz)
iDEN	Uplink	Low	806	19.302	17.8448
		Middle	813.5	19.265	17.8764
		High	821	20.071	17.8607
	Downlink	Low	851	19.208	17.7684
		Middle	858.5	19.118	17.8682
		High	866	19.229	17.7394

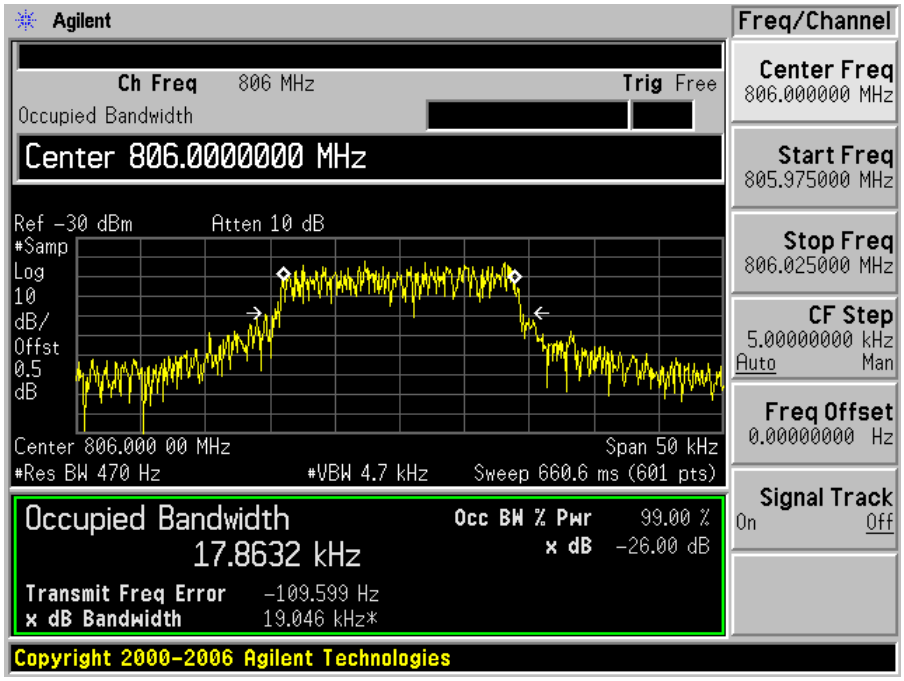
Test data

Please refer to the following plots.

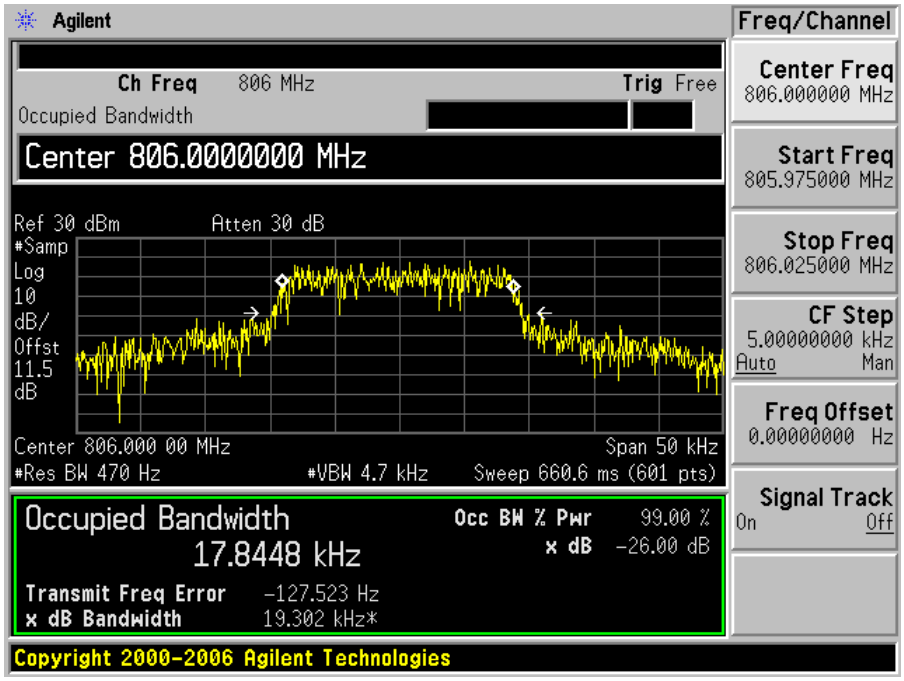
Uplink

Low Channel (806 MHz)

Input

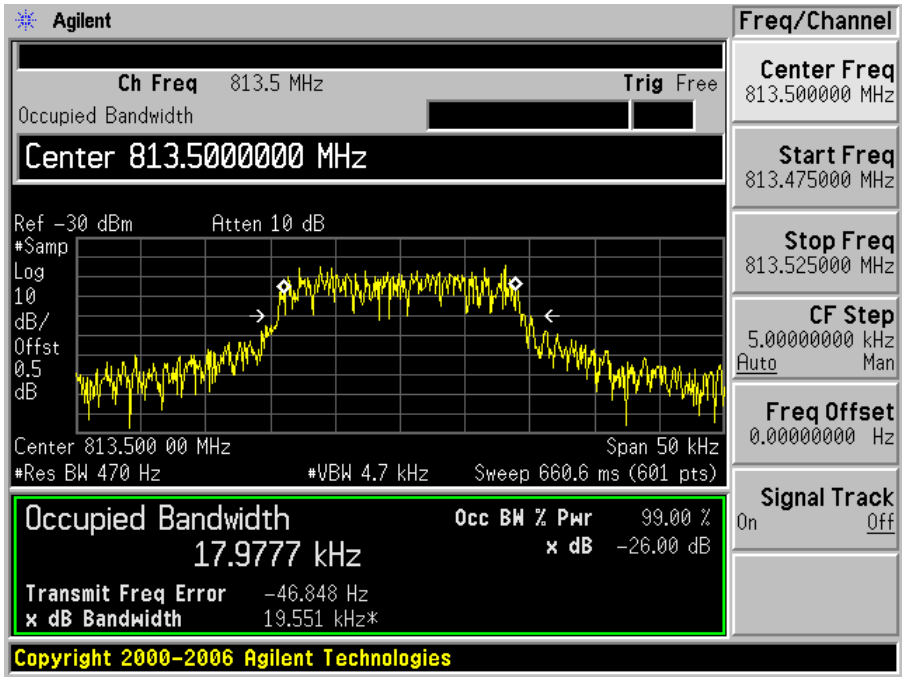


Output

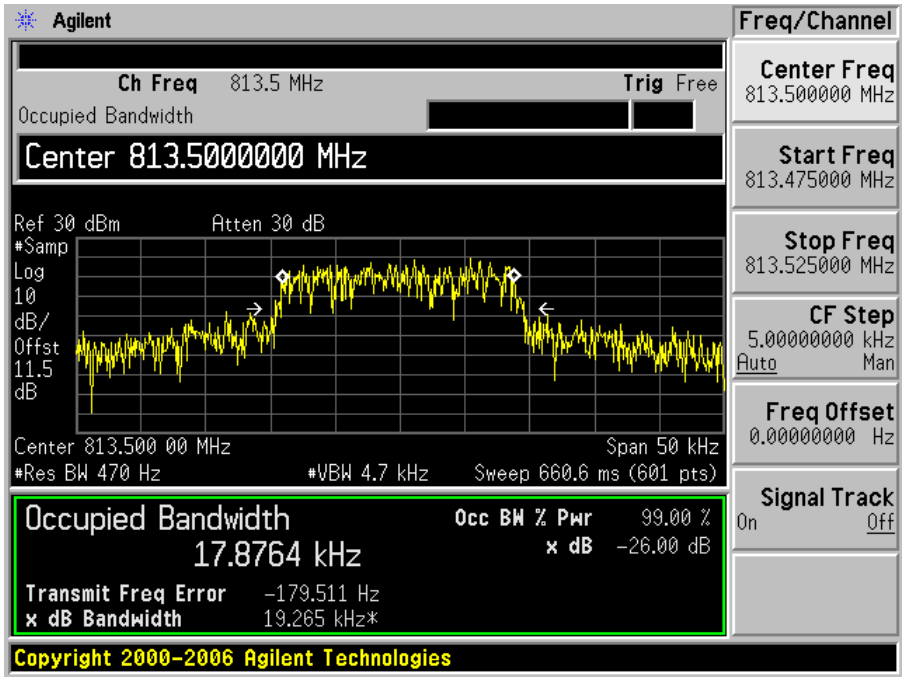


Middle Channel (813.5 MHz)

Input

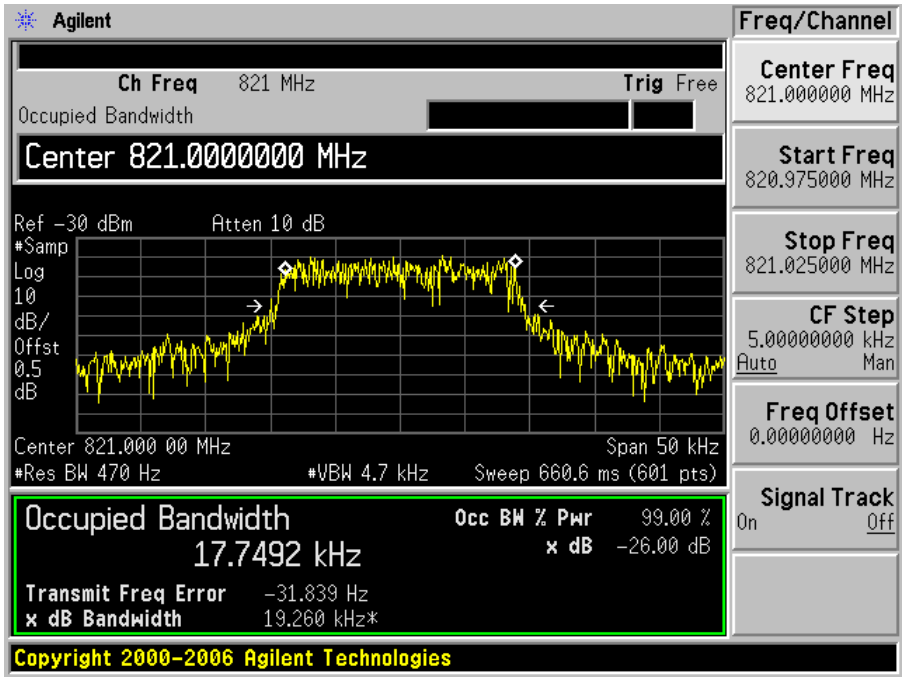


Output

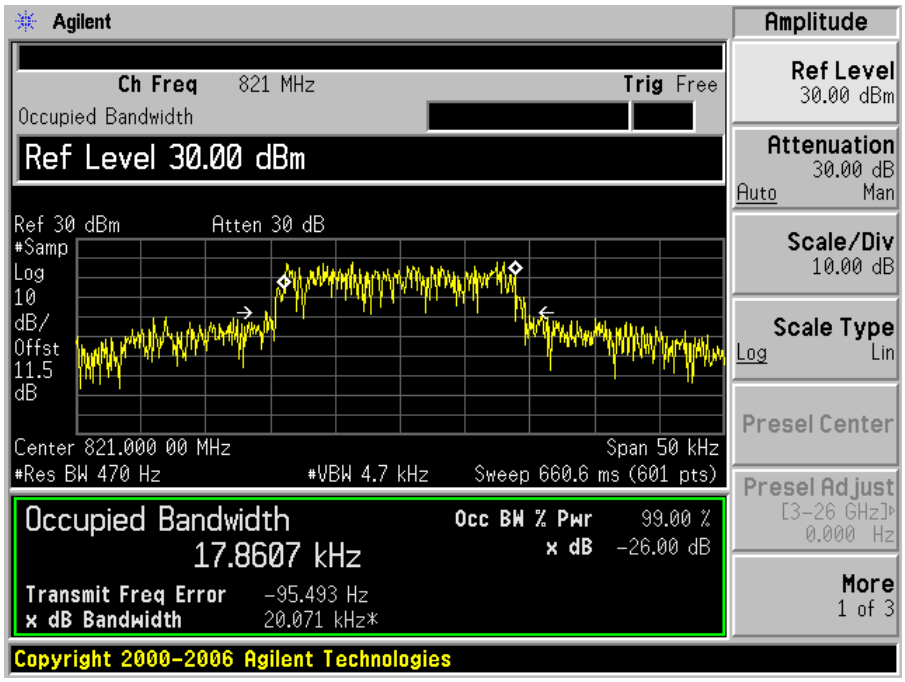


High Channel (821 MHz)

Input



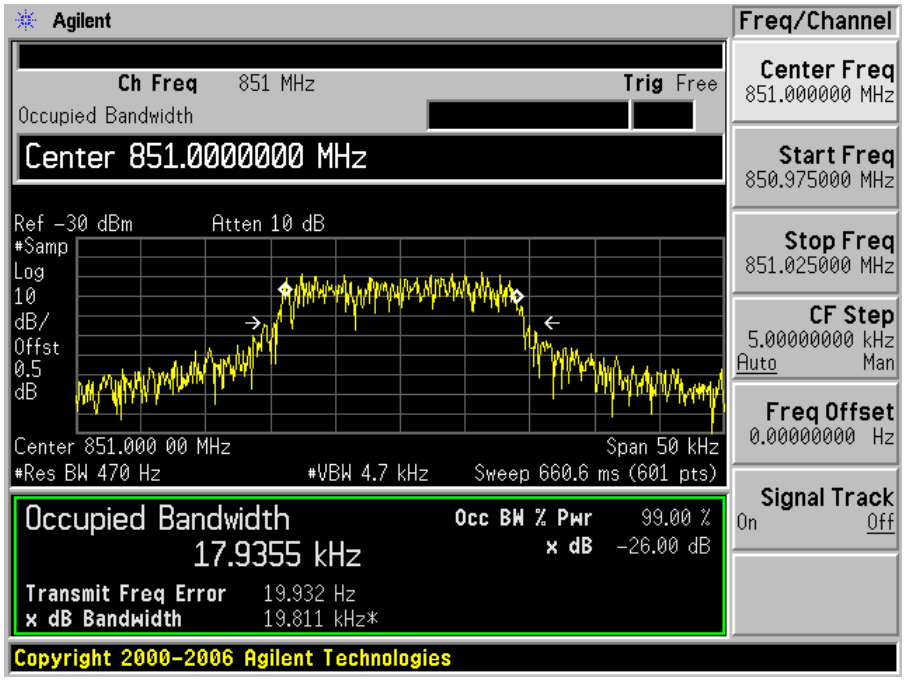
Output



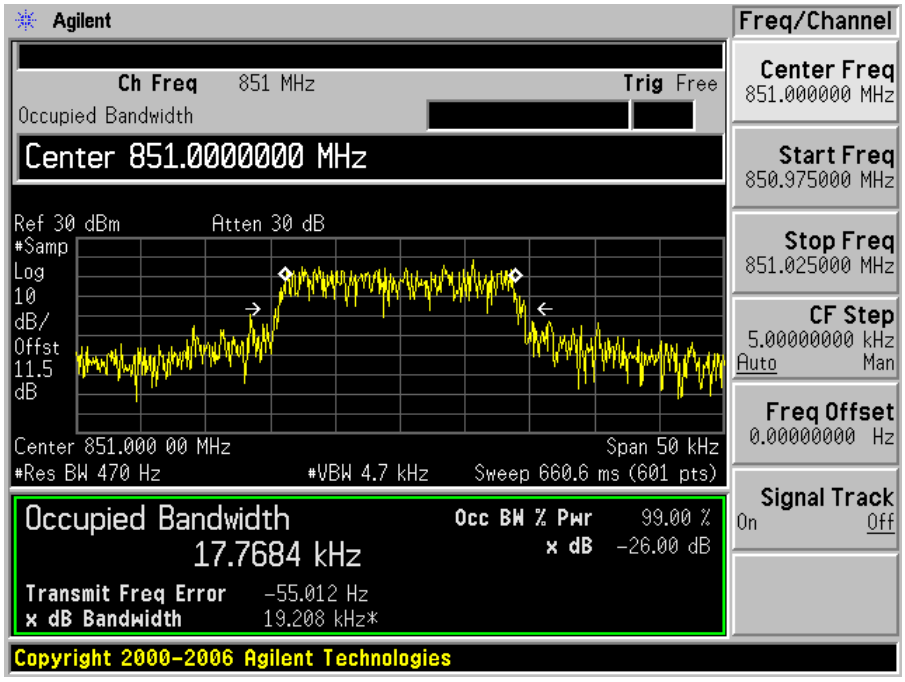
Downlink

Low Channel (851 MHz)

Input

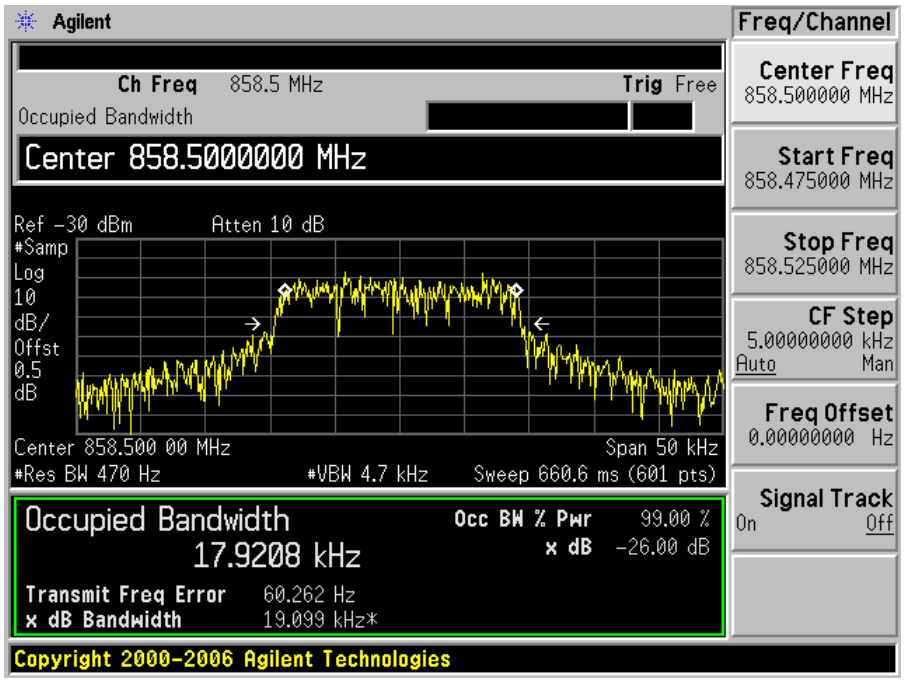


Output

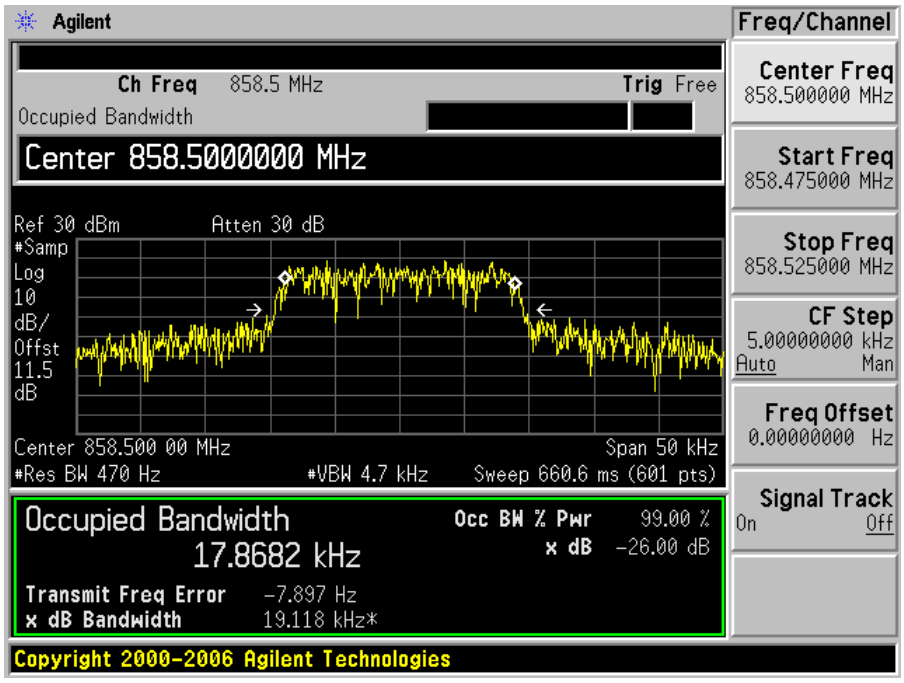


Middle Channel (858.5 MHz)

Input

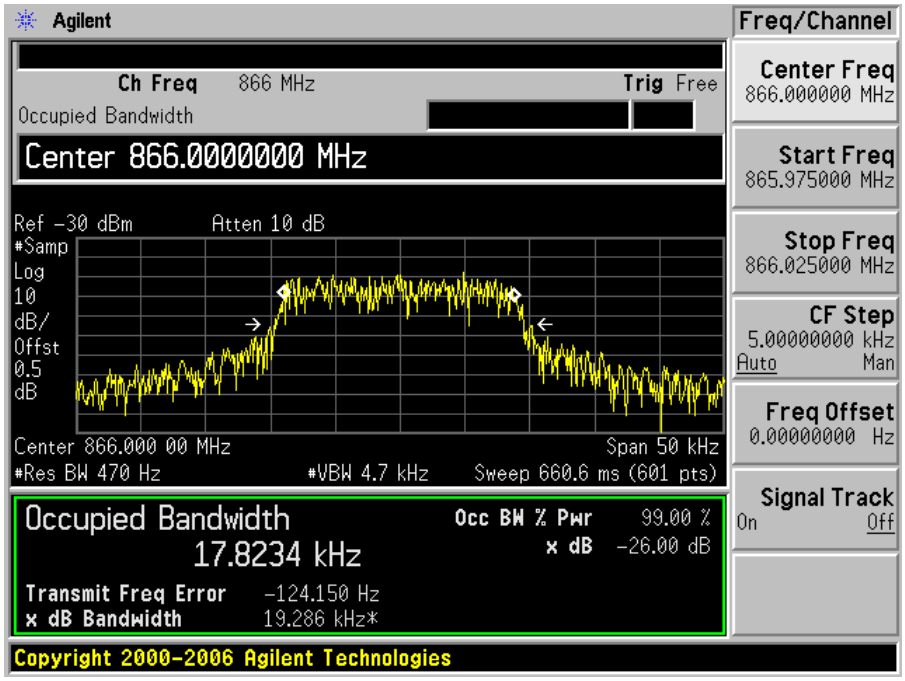


Output

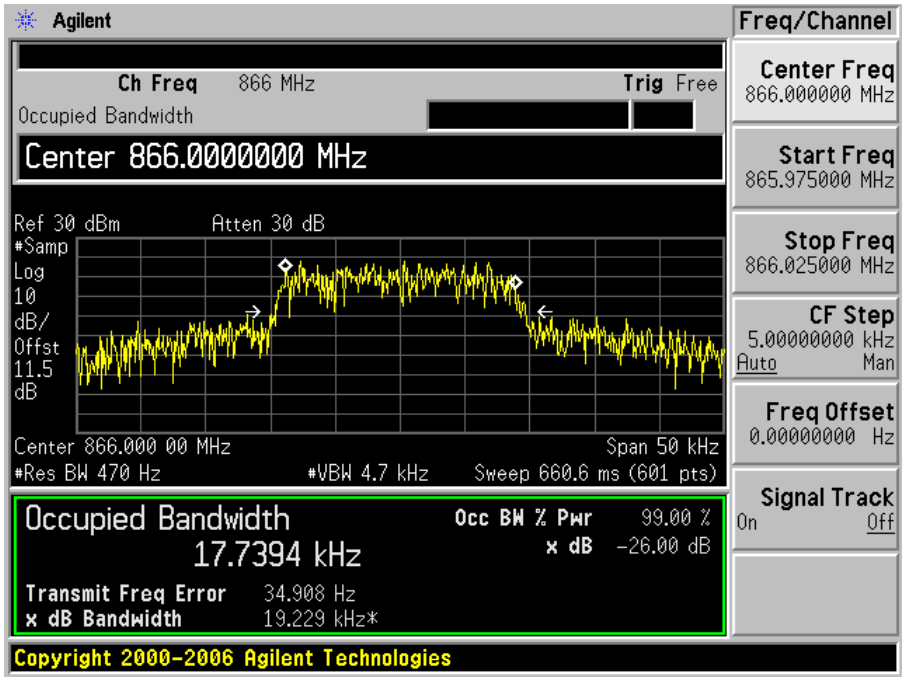


High Channel (813.5 MHz)

Input



Output



7 §2.1049, §90.210 – Emission Mask

7.1 Applicable Standard

Requirements: CFR 47, Section 2.1049, Section 90.210
Limits:

1. § 90.691 Emission Mask Requirements for EA-Based Systems – 25 kHz Channel Spacing – 800 MHz Operation
   0 – 12.5 kHz: 0 dBc
   12.5 – 37.5 kHz: 116*log10 (F/6.1) dB
   37.5 kHz - : 43 plus 10 log10 (P) dB

2. § 90.669 Emission Limits – 25 kHz Channel Spacing – 900 MHz Operation On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power (P) by at lease 43 plus 10log10(P) dB or 80 dB, whichever is the lesser attenuation.

7.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

7.3 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	44 %
ATM Pressure:	101.7kPa

** The testing was performed by Victor Zhang on 2008-11-26.*

7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	ESG Vector Signal Generator	E4438C	WBC88282L	2008-01-22
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

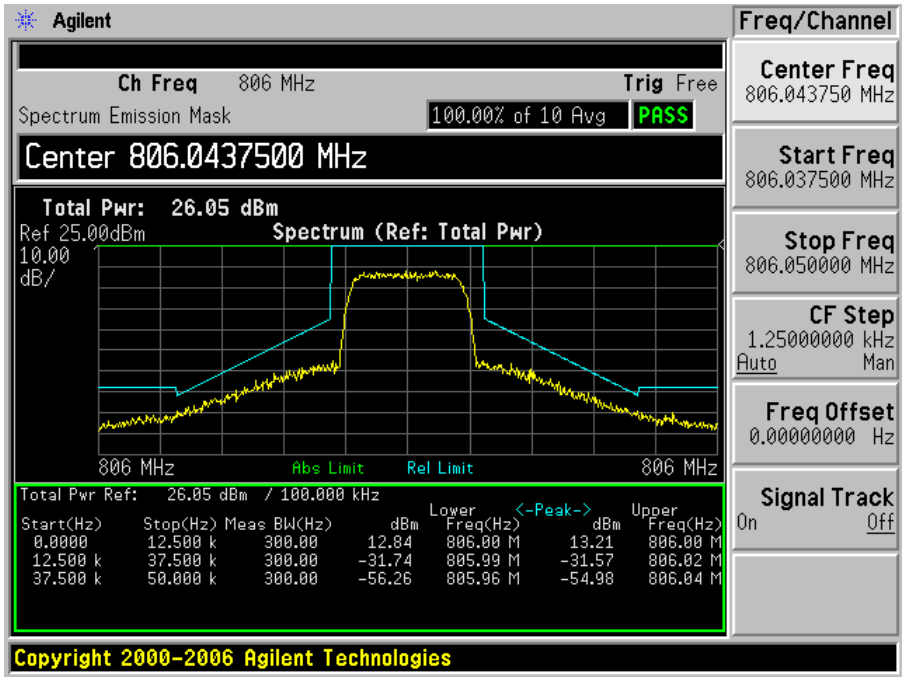
***Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.5 Test Data

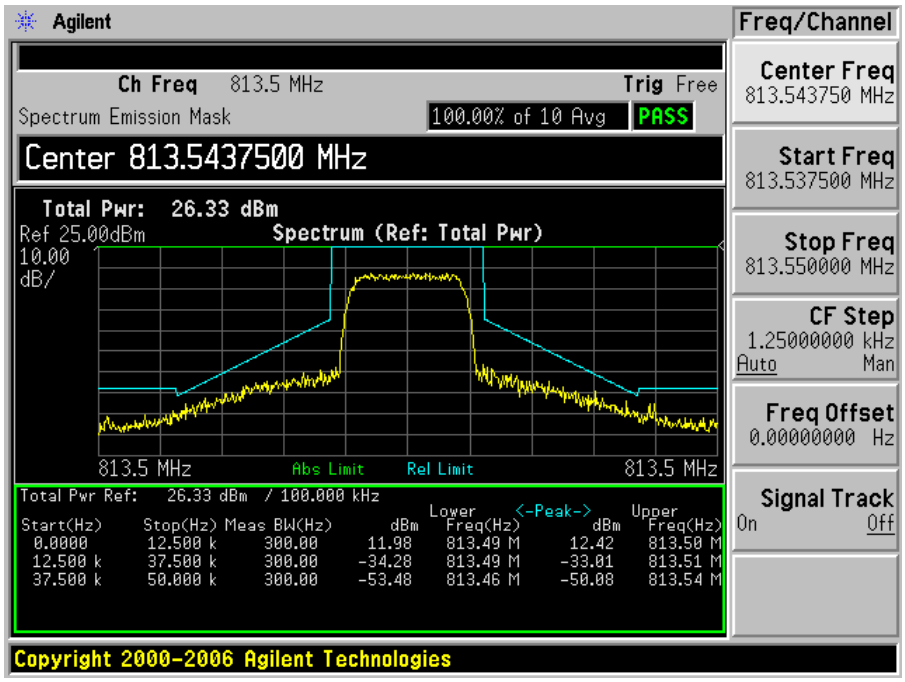
Please refer to the following plots.

Uplink:

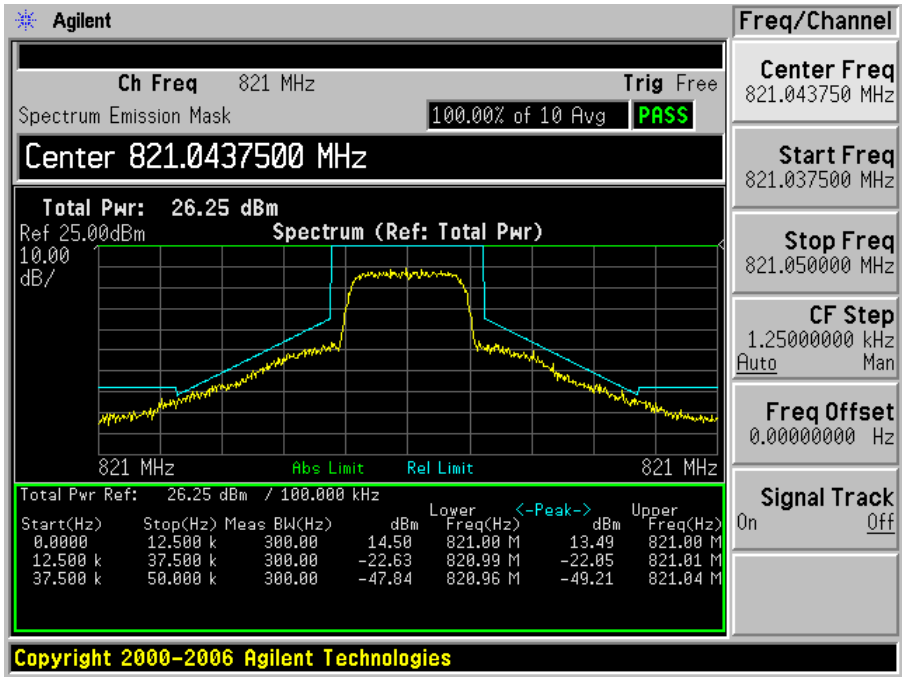
Low Channel (806 MHz)



Middle Channel (813.5 MHz)

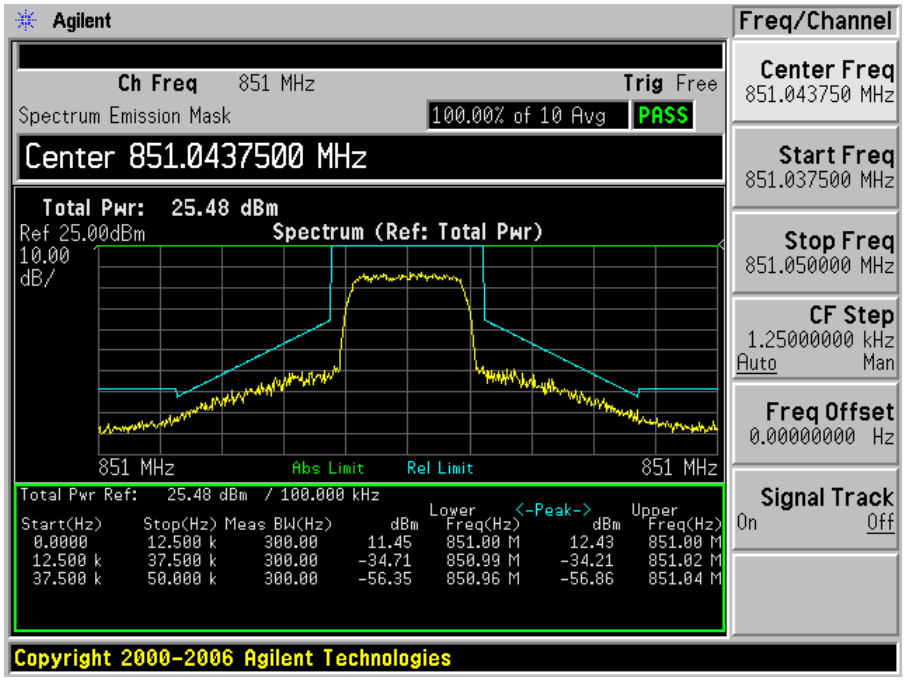


High Channel (806 MHz)

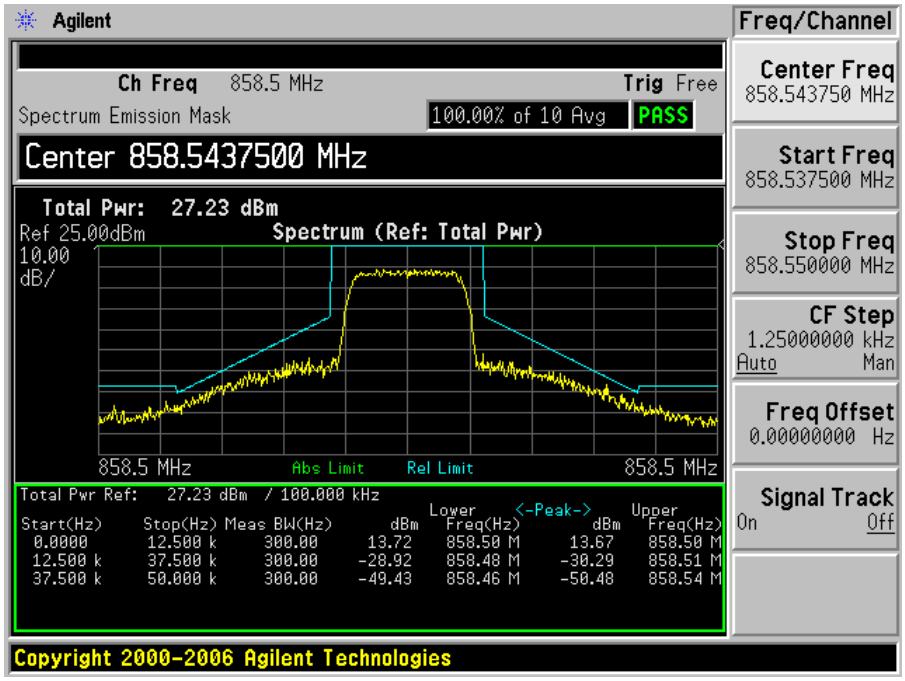


Downlink:

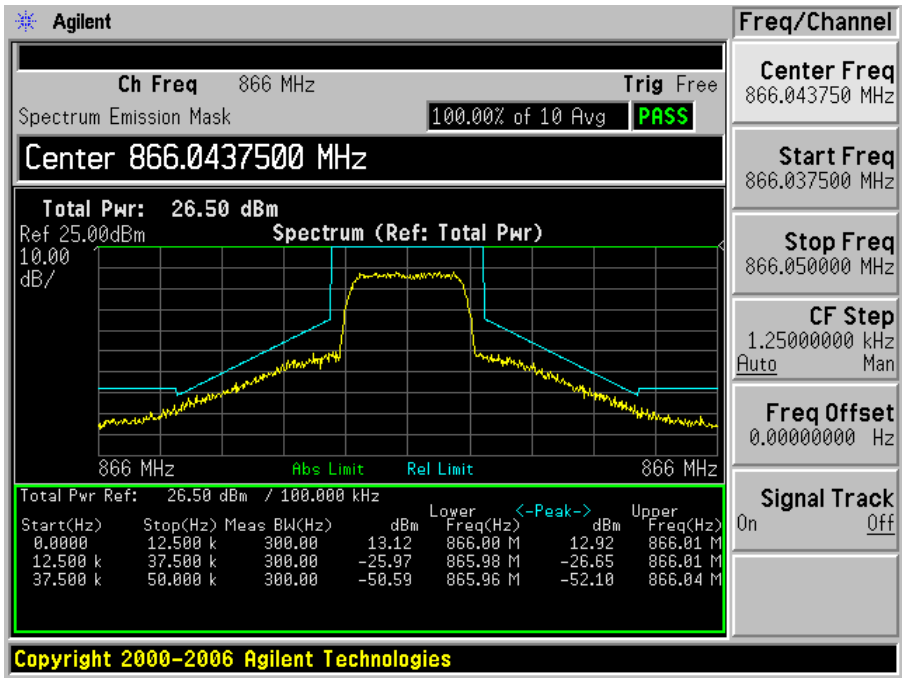
Low Channel (851 MHz)



Middle Channel (858.5 MHz)



High Channel (866 MHz)



8 §2.1051, §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

8.1 Applicable Standard

Requirements: CFR 47, § 2.1051. § 90.210.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

§ 90.210 & § 90.669 Emission limit:
On any frequency in an MTA licensee's spectrum block that is adjacent to a non-MTA frequency, the power of any emission shall be attenuated below the transmitter power(P) by at lease 43+ 10log10(P) dB or 80 dB, whichever is the lesser attenuation.

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10^{th} harmonic.

8.3 Environmental Conditions

Temperature:	18 °C
Relative Humidity:	40 %
ATM Pressure:	101.3kPa

** The testing was performed by Victor Zhang on 2008-12-01.*

8.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	ESG Vector Signal Generator	E4438C	WBC88282L	2008-01-22
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28

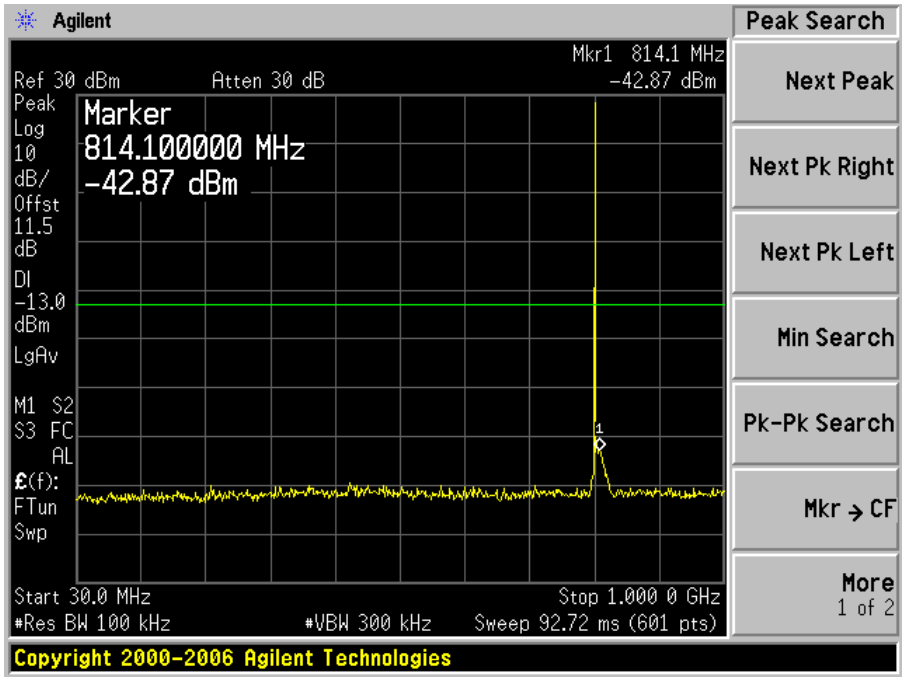
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

8.5 Test Data

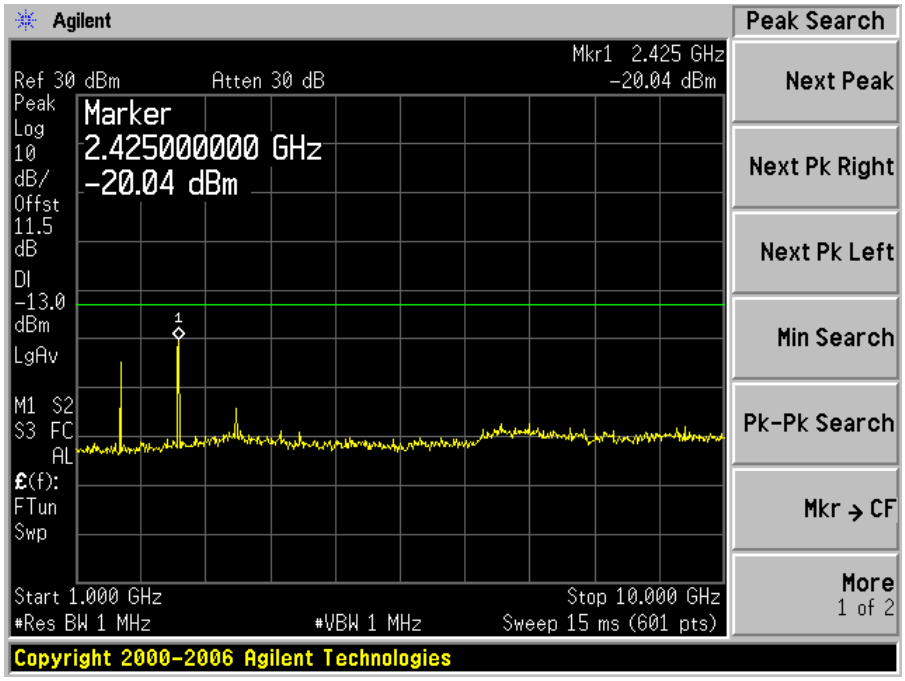
Please refer to the following plots.

Uplink:

Low Channel (806 MHz)

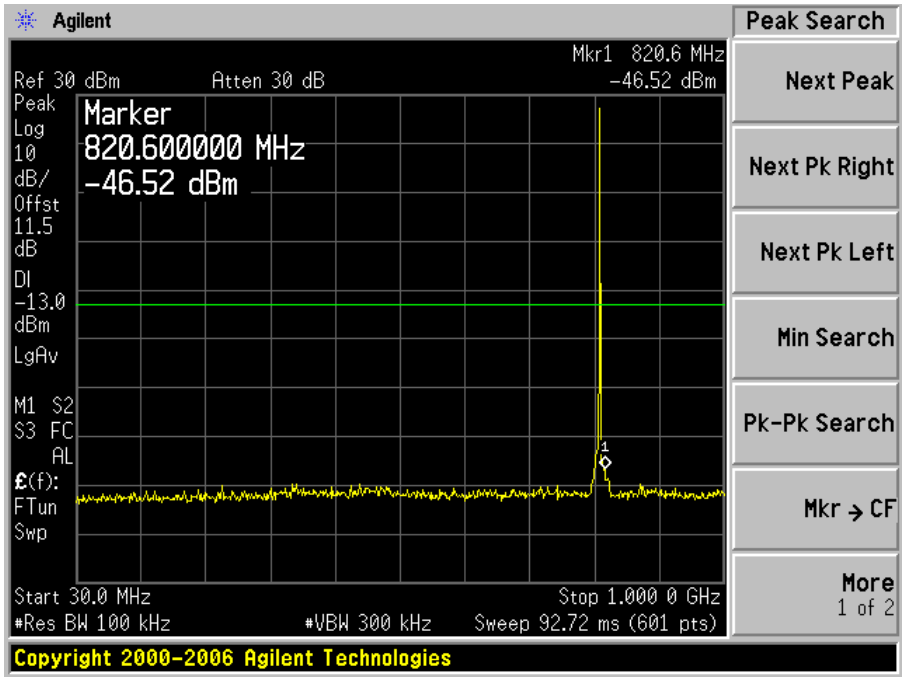


30 MHz – 1 GHz

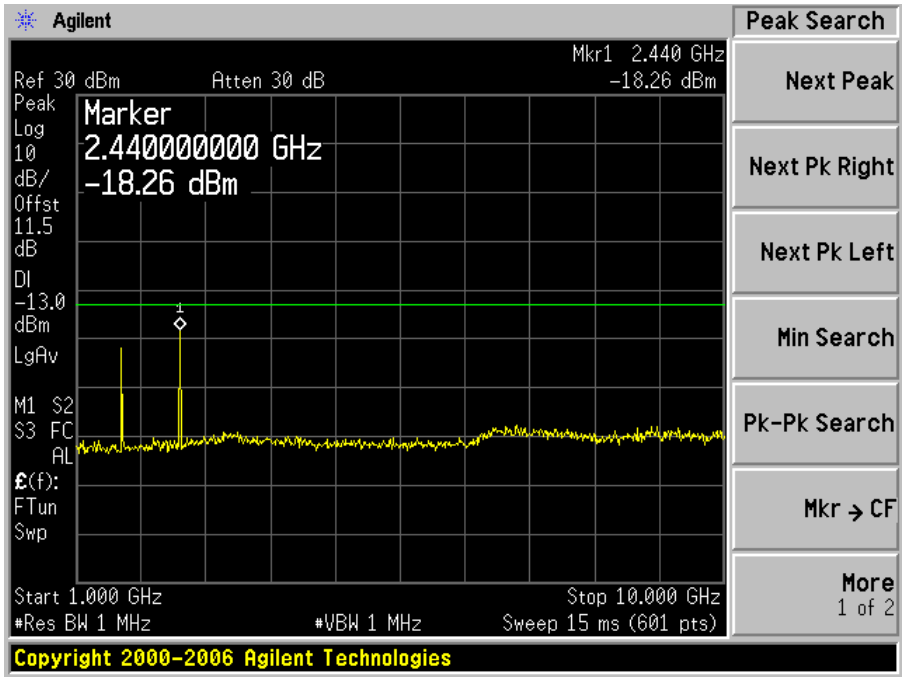


1 – 10 GHz

Middle Channel (813.5 MHz)

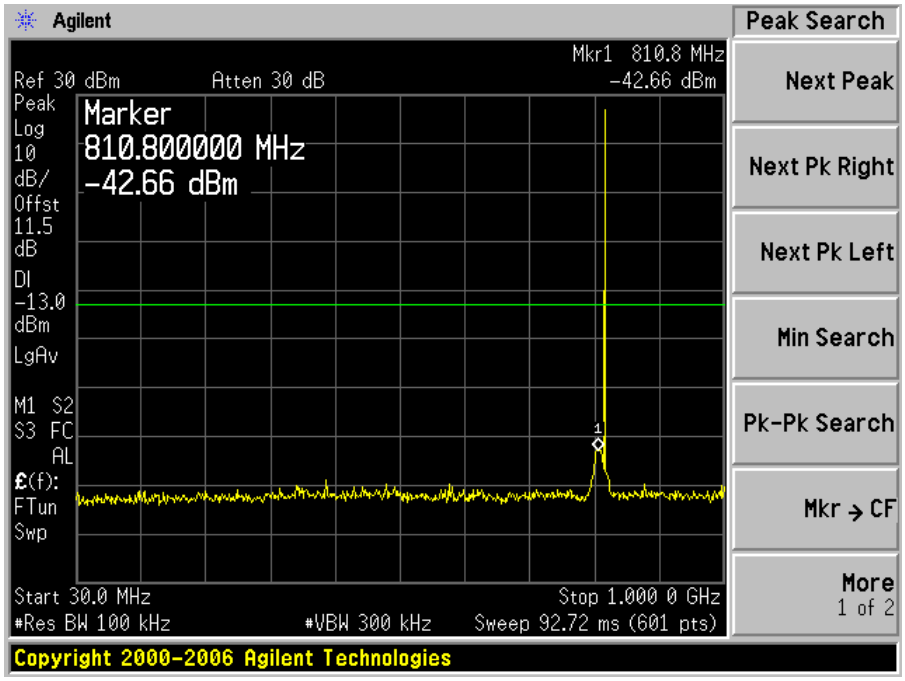


30 MHz – 1 GHz

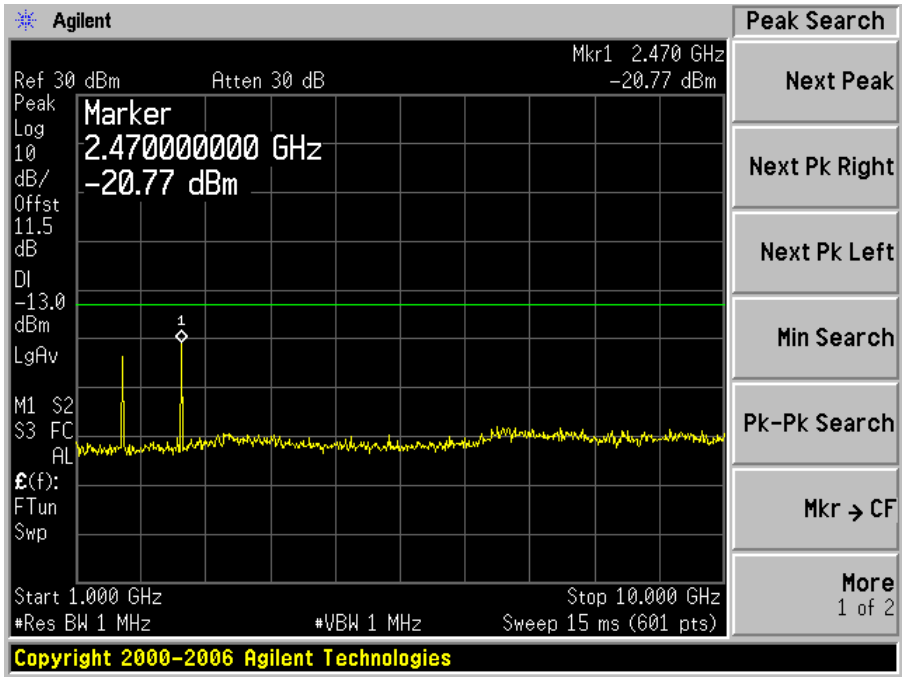


1 – 10 GHz

High Channel (821 MHz)



30 MHz – 1 GHz

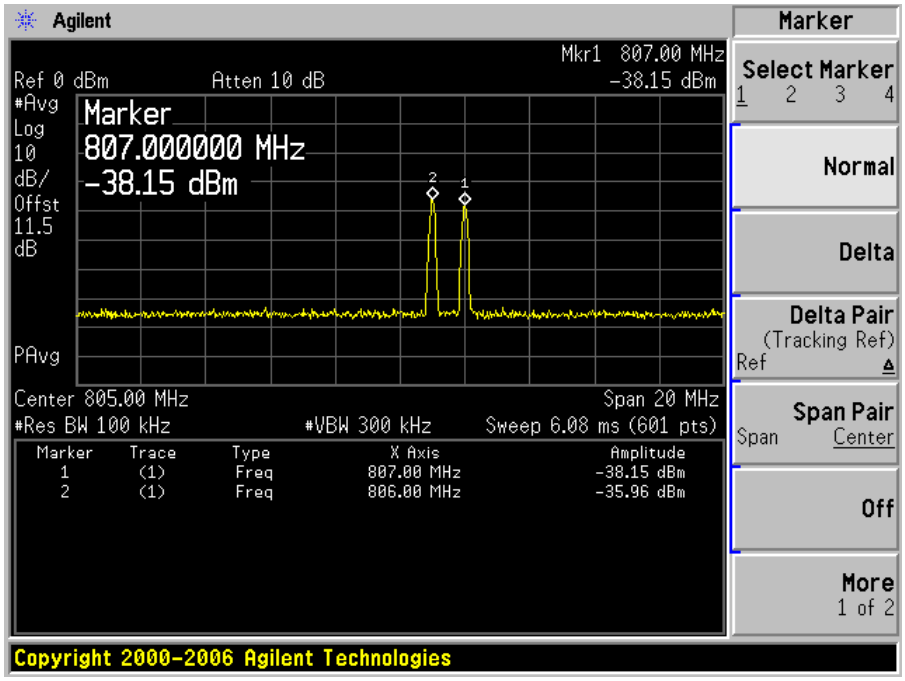


1 – 10 GHz

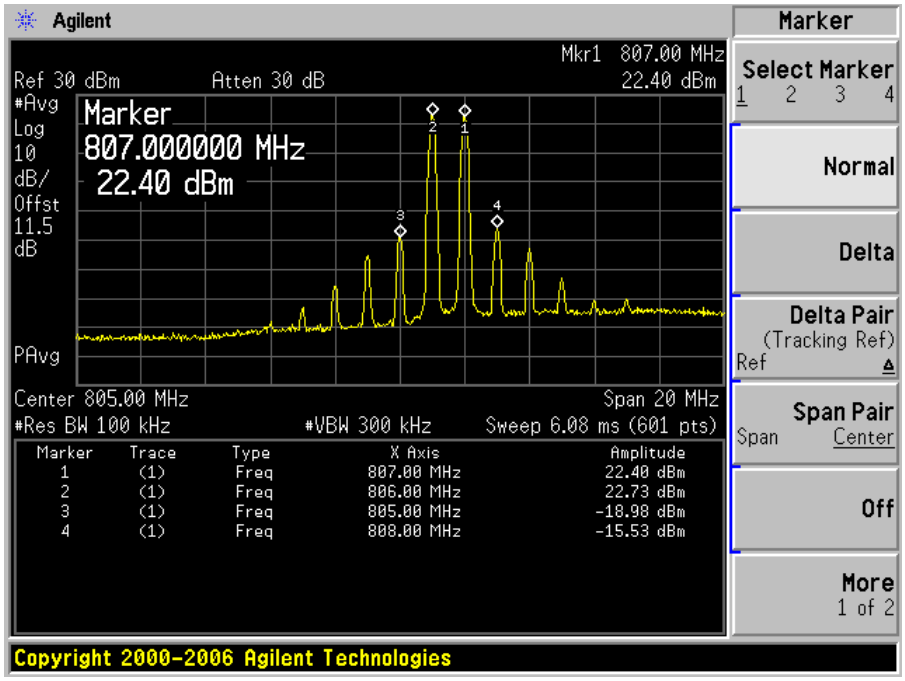
Uplink:

Two Carrier Intermodulation; Low end band edge; 806/807 MHz

Input



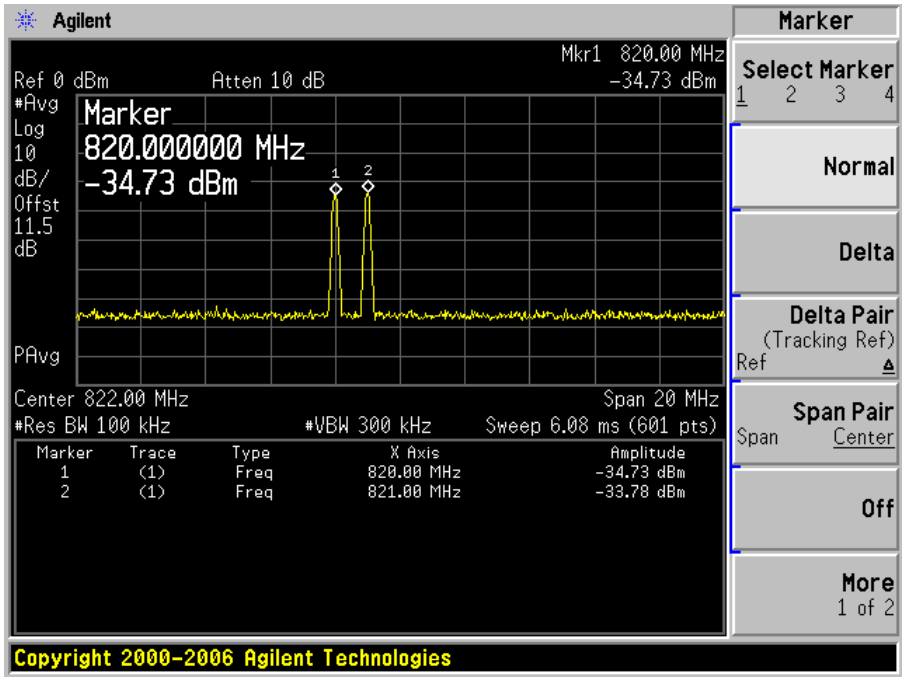
Output



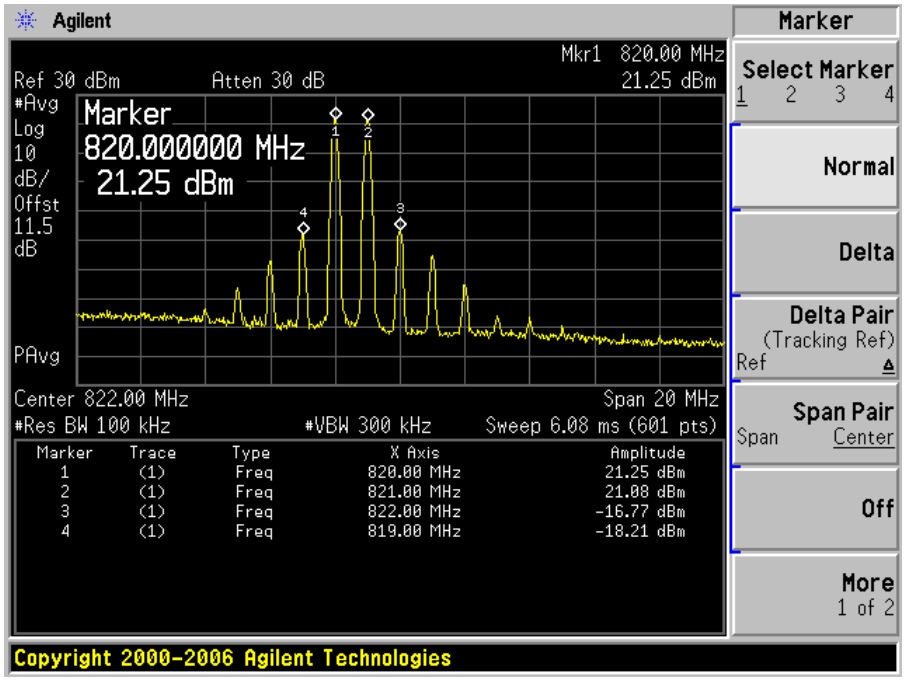
Uplink:

Two Carrier Intermodulation; High end band edge; 820/821 MHz

Input

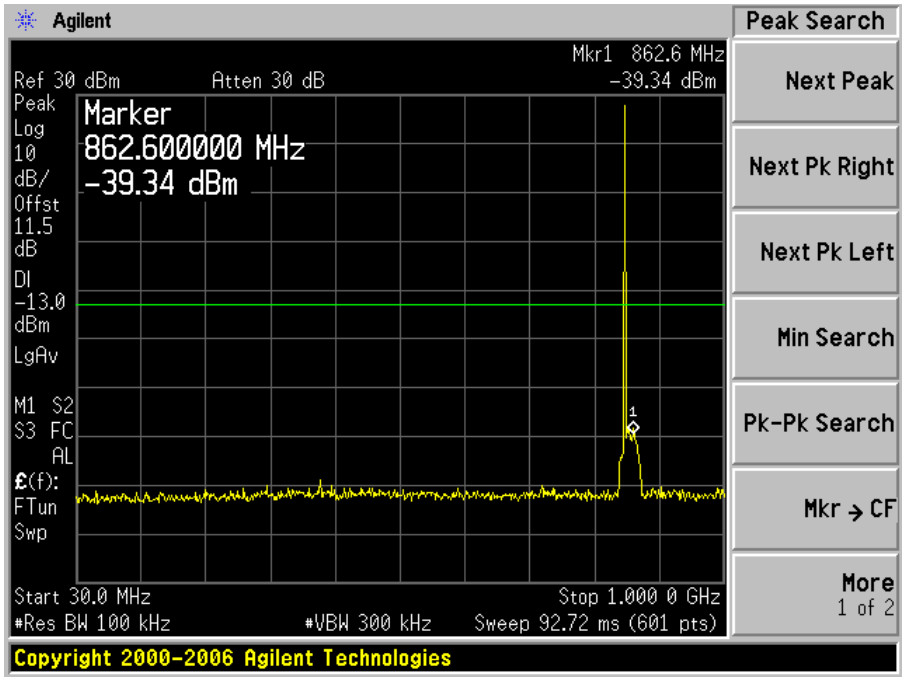


Output

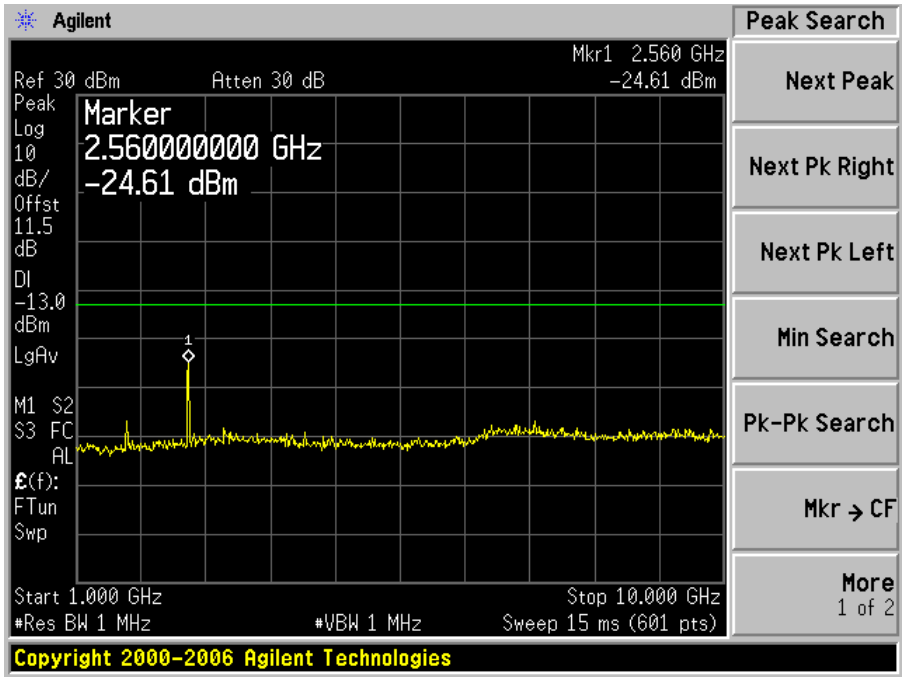


Downlink:

Low Channel (851 MHz)

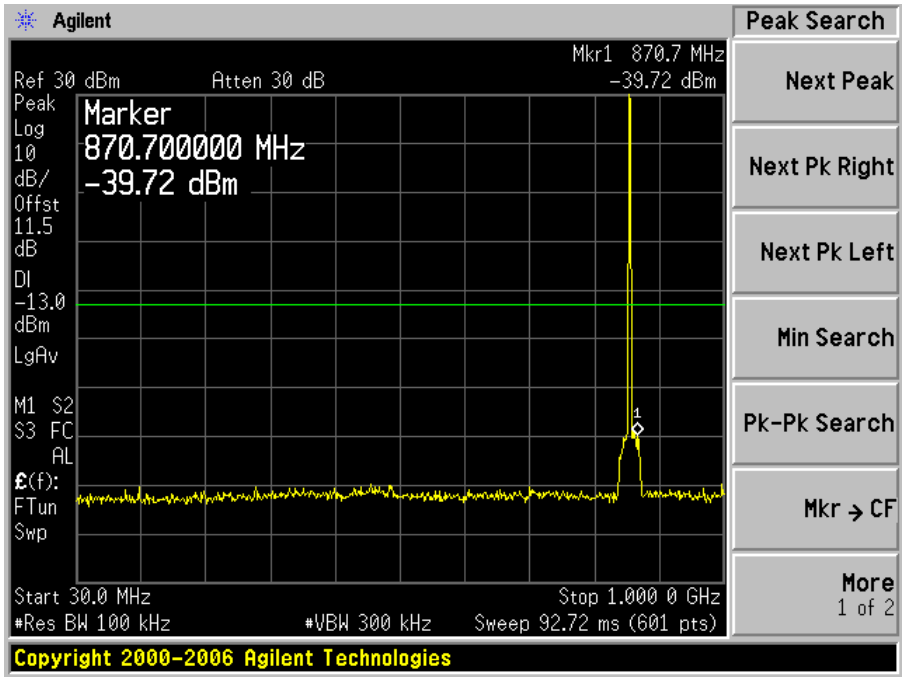


30 – 1 GHz

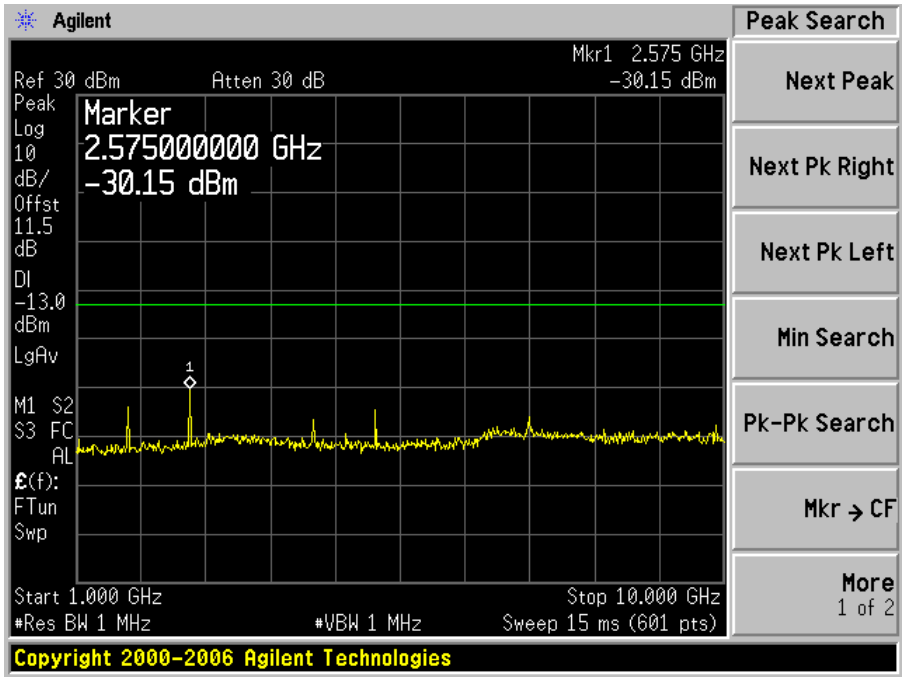


1 – 10 GHz

Middle Channel (858.5 MHz)

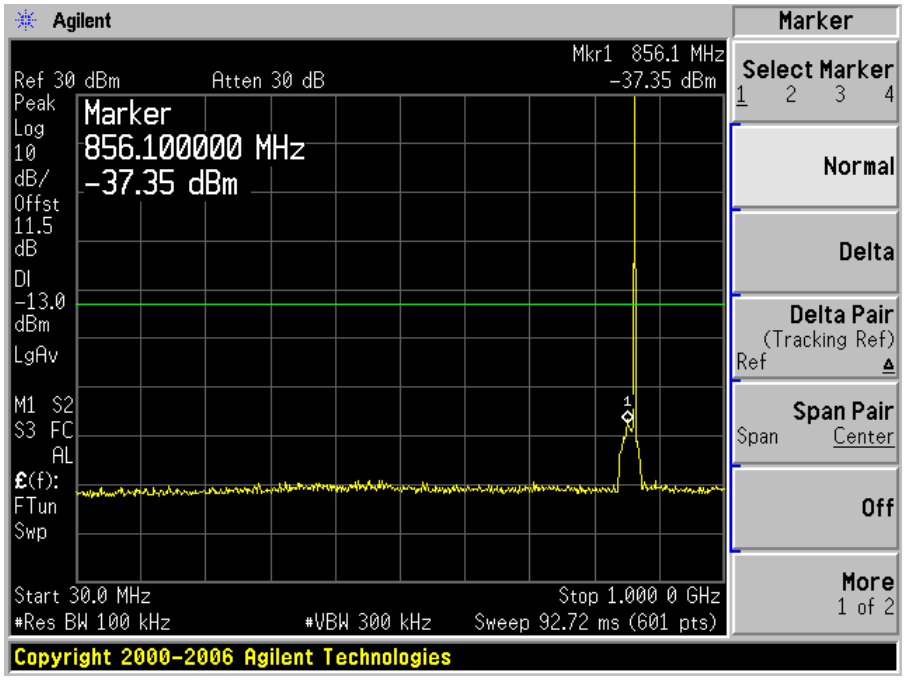


30 MHz – 1 GHz

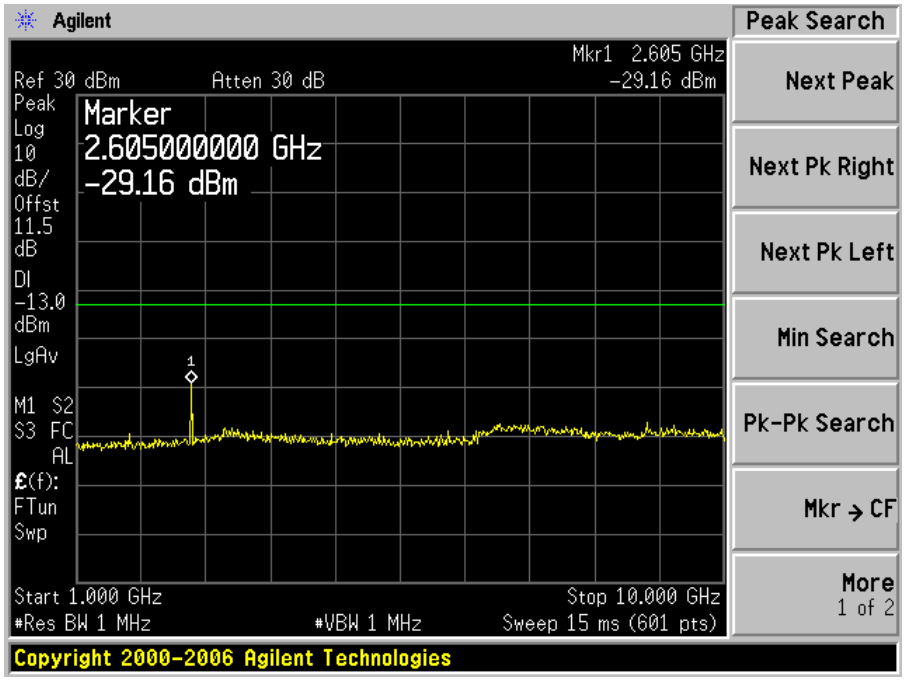


1 – 10 GHz

High Channel (866 MHz)



30 MHz – 1 GHz

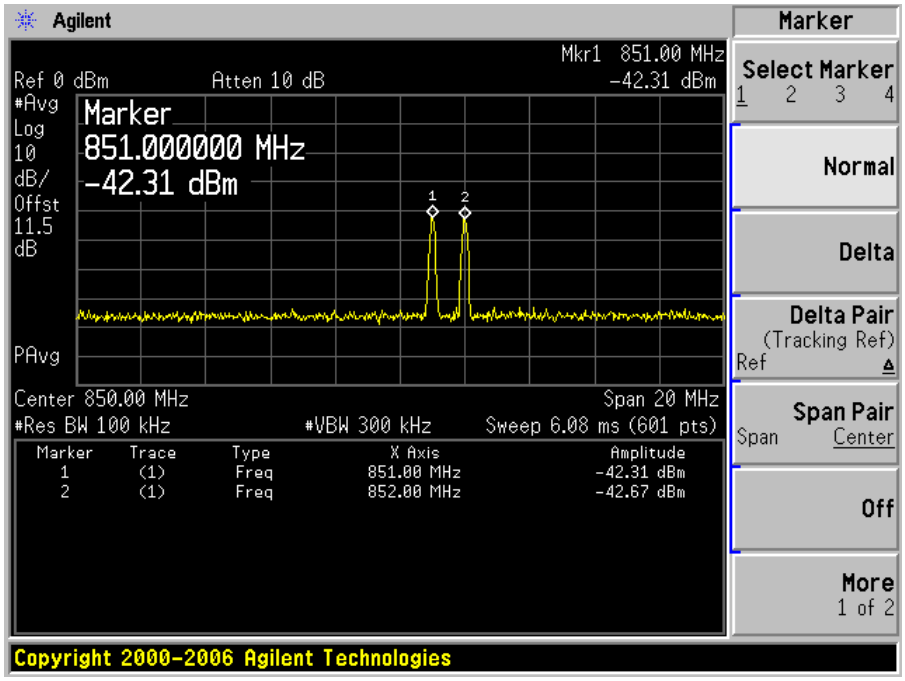


1 – 10 GHz

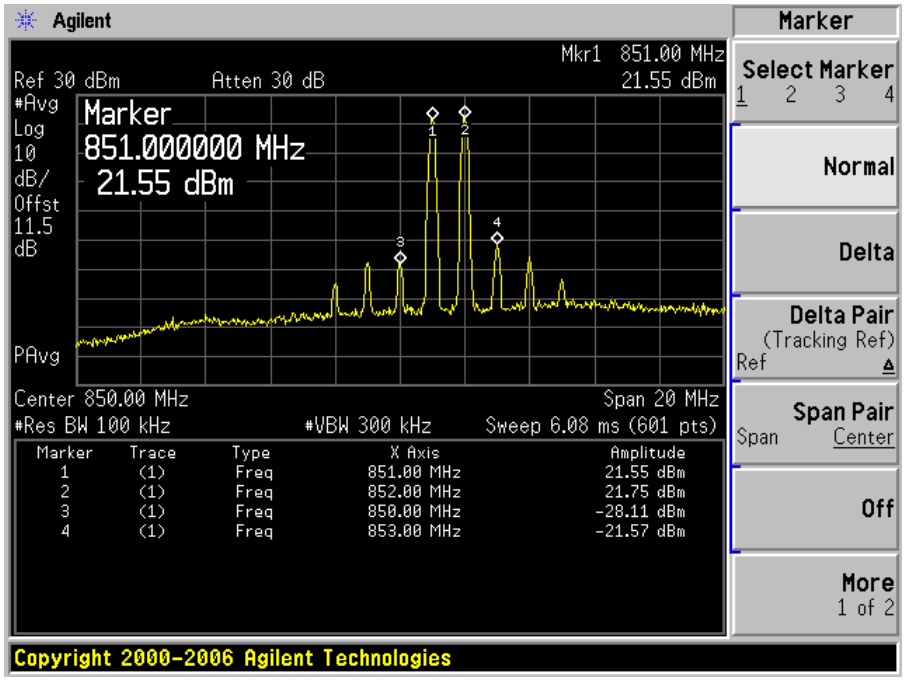
Downlink:

Two Carrier Intermodulation; Low end band edge; 851/852 MHz

Input



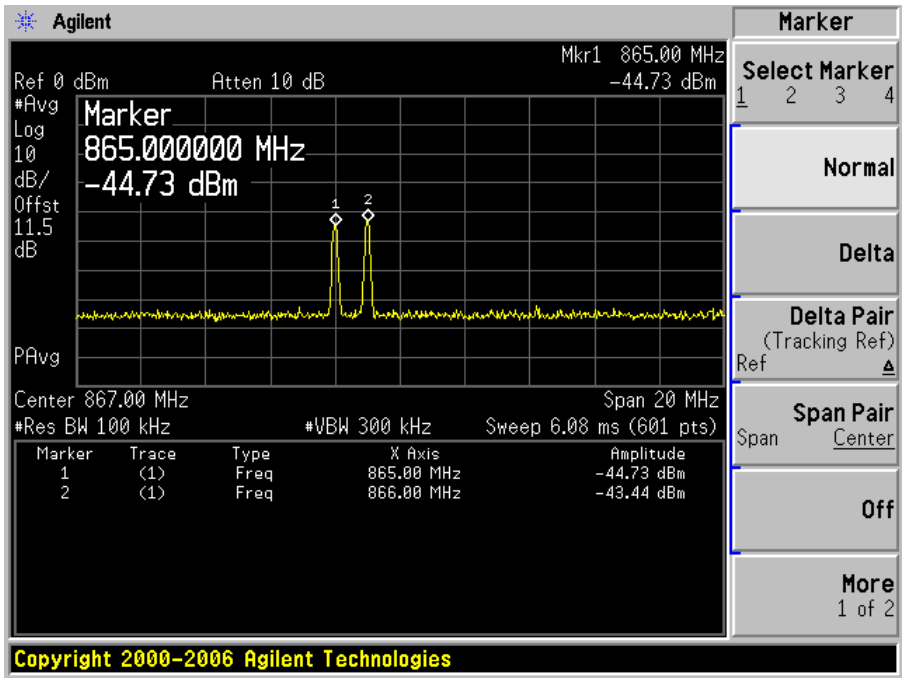
Output



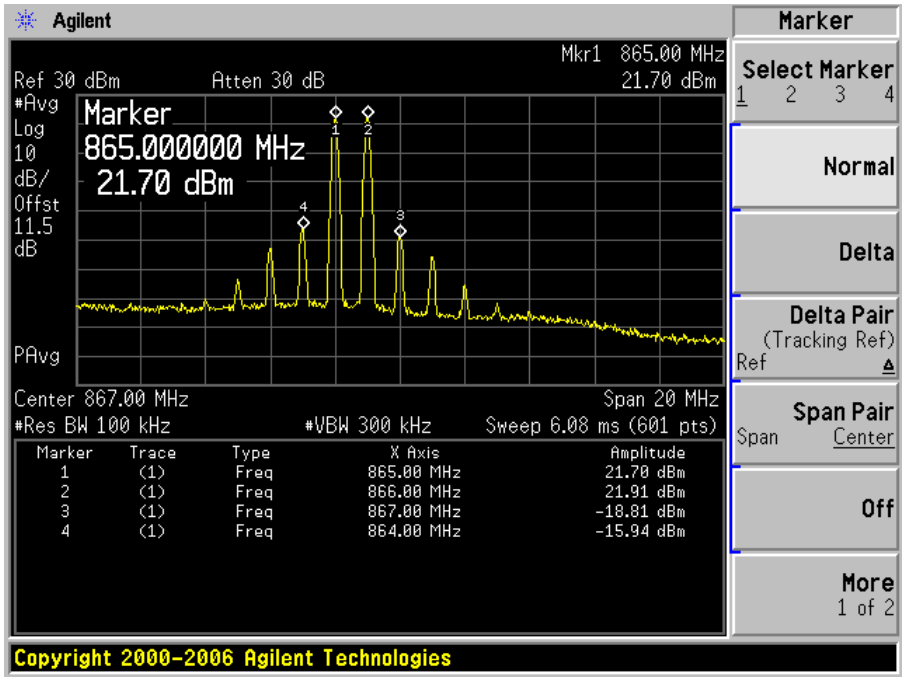
Downlink:

Two Carrier Intermodulation; High end band edge; 865/866 MHz

Input



Output



9 §2.1053- SPURIOUS RADIATED EMISSIONS

9.1 Applicable Standard

Requirements: CFR 47, § 2.1053.

9.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 log (TX power in Watts/0.001) – the absolute level
Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts) or -13 dBm

9.3 Environmental Conditions

Temperature:	18 °C
Relative Humidity:	40 %
ATM Pressure:	101.3kPa

** The testing was performed by Victor Zhang on 2008-12-01.*

9.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Mini-Circuits	Pre amplifier	ZKL-2	7786100643	2008-01-02
Agilent	ESG Vector Signal Generator	E4438C	WBC88282L	2008-01-22
HP	Pre amplifier	8449B	3147A00400	2008-10-22
Sunol Science Corp	Combination Antenna	JB1 Antenna	A103105-3	2008-03-25
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2008-07-01
Agilent	Spectrum Analyzer	E4440A	MY44303352	2008-04-28
A.R.A.	Antenna, Horn	DRG-118/A	1132	2008-07-28

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

9.5 Summary of Test Results

Worst case reading as follows:

Mode: Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-7.16	1717	Horizontal	858.5 MHz

Mode: Uplink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-9.33	2440.5	Vertical	813.5 MHz

9.6 Test Data

Downlink:

Input frequency = 858.5 MHz

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Antenna Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1717.0	72.20	336	1.15	H	1717	-28.56	9.3	0.90	-20.16	-13	-7.16
2575.5	70.12	345	1.1	H	2575.5	-29.00	9.4	1.18	-20.78	-13	-7.78
2575.5	64.95	92	1.05	V	2575.5	-32.15	9.4	1.18	-23.93	-13	-10.93
1717.0	59.44	170	1.5	V	1717	-42.56	9.3	0.90	-34.16	-13	-21.16
3434.0	50.15	195	1.5	H	3434	-46.35	9.9	1.21	-37.66	-13	-24.66
3434.0	46.45	323	1.2	V	3434	-48.85	9.9	1.21	-40.16	-13	-27.16

Uplink:

Input frequency = 813.5 MHz

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dBuV)		Height (m	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Antenna Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
2440.5	68.02	264	1.84	V	2440.5	-30.76	9.6	1.17	-22.33	-13	-9.33
1627.0	70.03	335	1.00	H	1627.0	-30.83	9.2	0.90	-22.53	-13	-9.53
2440.5	68.21	335	1.32	H	2440.5	-31.99	9.6	1.17	-23.56	-13	-10.56
1627.0	56.27	160	1.45	V	1627.0	-47.17	9.2	0.90	-38.87	-13	-25.87
3254.0	42.64	340	1.00	H	3254.0	-54.82	9.6	1.20	-46.42	-13	-33.42
3254.0	40.99	230	1.00	V	3254.0	-54.86	9.6	1.20	-46.46	-13	-33.46

10 §90.213 – Frequency Stability

10.1 Applicable Standard

§ 90.213

±1 ppm of the Operating Frequency Tuned

10.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to the Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 110% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

10.3 Test Results

N/A. This EUT is an amplifier, not a transmitter. There is no oscillator circuit in the EUT, therefore there is no frequency stability measurement required.

11 §1.1307(b) (1) & §2.1091 - RF EXPOSURE

11.1 Applicable Standard

According to §1.1310 and §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

11.2 MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S = PG/4\pi R^2$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Uplink:

Maximum peak output power at antenna input terminal (dBm):	26.58
Maximum peak output power at antenna input terminal (mW):	454.99
Prediction distance (cm):	45
Prediction frequency (MHz):	813.5
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.12
Power density at predication frequency and distance (mW/cm^2):	0.4492
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5423

Downlink:

Maximum peak output power at antenna input terminal (dBm):	27.20
Maximum peak output power at antenna input terminal (mW):	524.81
Prediction distance (cm):	45
Prediction frequency (MHz):	858.5
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.12
Power density at predication frequency and distance (mW/cm^2):	0.5181
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5723

11.3 Test Result

The device is compliant with the requirement MPE limit for uncontrolled exposure at predication frequency 0.5423 mW/cm^2 and 0.5723 $mW/cm^{2.}$ The maximum power density at the distance of 45 cm was 0.4492 mW/cm^2 and 0.5181 $mW/cm^{2.}$ Thus, the requirement of at least 45 cm required by the manufacturer is in compliance with the MPE requirement.